

## **REMARKS**

Before addressing the merits in the Office Action, applicants would like to express appreciation to Examiner Ernest G. Therkorn for granting an interview to discuss the merits of the present application on October 22, 2007 and for his suggestions in advancing the prosecution of the instant application.

Favorable reconsideration of this application in view of the remarks to follow and allowance of the claims of the present application are respectfully requested.

Applicants have amended the claims as indicated in the above manner by deleting claims 1-41 without prejudice, and adding new claims 42-62. The claims that have been presented herein are consistent with the discussions had with Examiner Therkorn on October 27, 2007.

For the added new claims, Claims 42-46 are independent claims and Claims 47-70 are dependent claims. Specifically, Claim 42 combines the subject matter of original Claims 1 and 39. Claim 43 is supported by the disclosure on Pages 3, line 31 to Page 4, line 9 and Page 5, lines 20-30, original Claim 1, and Page 8, lines 16-19 of the instant specification. Claim 44 is supported by original Claim 1, and Example 12 (specifically starting on Page 33, line 11) and Figure 12. Support for Claim 45 is found in Claim 1 and Example 12 (specifically page 33, line 13) and Figure 11 of the instant specification. The support for Claim 46 is original Claim 1, Example 12 and Figure 11 of the present application. Support for Claims 47-50 is original Claims 3-6, respectively. Support for Claim 51 is original Claim 15. Support for Claims 52-60 is original Claims 29-37, respectively. Claims 61-62 rewrites the subject matter in Claims 40 and 41. Support for Claims 63-70 is found in original Claims 7-13 and 18, respectively.

It is to be noted that applicants have not abandoned the deleted subject matter and reserve the right to file a continuation application directed thereto.

Since the above amendments to the claims do not introduce any new matter into the application, entry thereof is respectfully requested.

This response regarding the prior art rejections is divided into two parts. The first part relates to the rejections wherein the '260 reference is, inter alia, the primary reference against the independent claims and all arguments relating thereto with respect to the dependent claims in this first part are incorporated by reference. It will be indicated by I. The second part relates to rejections wherein the '260 reference is a secondary reference against the independent claims, and all arguments relating thereto with respect to the dependent claims in the second part are incorporated by reference. It will be indicated herein by II.

After the first rejection in each part, the Office Action rejects dependent claims applying additional art to the subject matter recited in dependent claims. These secondary references do not address any of the subject matter in the main claims. Thus, inasmuch as the dependent claims are dependent upon Claims 42-46, and, as shown below, inasmuch as the secondary references do not address the inadequacies of the rejection against the independent claims in each section, it is respectfully submitted that since the dependent claims are dependent on Claims 42-46, which by the arguments herein are patentable over the art, the dependent claims are also patentable thereover.

As indicated hereinabove, applicants have deleted Claims 1-41. Thus, the rejections are not specifically aimed at the pending claims. Thus, whenever possible, the rejections will be addressed against the corresponding claims that are currently pending. Otherwise, they will be applied against the main independent claims.

In addition, with respect to the '260 reference, which is in Japanese, unless indicated to the contrary, all reference thereto will be made to the Japanese translation.

I. In the Office Action, Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 stand rejected under 35 U.S.C. §103(a) as obvious over Japan Patent No. 4-158260 to Hirata ('260) or what is allegedly conceded to be old on pages 1-3 of the instant specification in view of U.S. Patent No. 5,772,874 to Quinn ('874), U.S. Patent No. 5,084,104 to Heikkilä ('104) and U.S. Patent No. 6,146,856 to Heikkilä ('856).

With respect to the instant §103 rejection, applicants submit that the claims of the present invention, as amended, are not rendered obvious by the disclosures of any of the cited references, since the applied references do not teach, disclose or suggest applicants' claimed method.

Applicants submit that there are several differences between the methodology in the '260 reference and that of the present invention. For example, as indicated above, the '260 reference teaches that the column filling material in the anion exchange resin has a particle size of no greater than 50 micrometers. Moreover, the '260 reference discloses that particle sizes of filler "exceeding 50 micrometers causes drastic reduction of separation capacity and is not practical" (see the third paragraph of Page 6 of the '260 reference). In contrast, in the present invention, the particle size of the column filling material, in the ion exchange resin, is 100-2000 micrometers. Therefore, the '260 reference actually teaches away from the present invention, as recited in Claims 42 et seq. Further, the '260 reference teaches that a 50%-90% acetonitrile solution is used as eluant in the separation method disclosed therein, whereas water is used as eluant in the present invention. To a person skilled in the art, 50%-90% acetonitrile solution is different from water since they have different properties, e.g., polarity. Therefore, it is not

obvious for one ordinary skill to modify the teachings of the '260 reference, e.g., the particle size of the column filling material and the eluant, and apply them in the method of separation as claimed in the present invention with a reasonable expectation of success.

Moreover, the Office Action admits that the deficiency of the primary references (Japan Patent No. 4-158260 to Hirata ('260) or what is allegedly conceded to be old on pages 1-3 of the instant specification) are: (1) they fail to disclose that the particle size of the filler is at least 100-2000 micrometers; (2) they fail to teach that the eluant used in the separation being water.

Applicants want to draw the Examiner's attention that the effectiveness of a chromatographic separation is dependent upon many conditions, including, without limitation the type of resin, the constituents in the feed solution, and the amount of each constituent in the solution, the type of column used in the eluant. Since the conditions are different in the prior art than in the present invention, one cannot merely extrapolate the conditions taught in the prior art to effect the separation claimed in the present invention. Moreover, there is no way of predicting that the conditions used in the prior could also be used in the present invention. The type of methodology utilized is dependent upon each set of circumstances and cannot be generalized.

Furthermore, regarding the cited references in what is allegedly conceded to be old on Pages 1-3 of the instant specification, the '631 patent and the publications of Tanaka, Paskach, 'H-225, Bilik, Lindberg, Oshima, Bauer, Brown and Malan do not disclose or suggest the use of weakly basic anion exchange resin. Therefore, the combination of the '260 reference with the above-identified secondary references from that which is allegedly conceded to be old on Pages 1-3 of the instant specification, does not teach or suggest the use of a weakly basic anion exchange resin. Regarding the rest of the cited references from what is allegedly conceded

to be old on Pages 1-3 of the instant specification, i.e., the '791 patent and the publication of Murphy, applicants submit that although they refer to the use of weakly basic anion exchange resins, they teach away from the invention as defined in Claims 42 et seq. Specifically, the '791 patent discloses a method wherein the components comprised of sugars cannot be separated from each other with this method (see Page 1, lines 29-31 of the instant specification), which is contrary to the methodology of the present invention. Consequently, based therein, one of ordinary skill in the art would not combine the '260 reference with the '791 patent. Moreover, the Murphy reference refers to significant losses of neutral sugars in the separation method described therein (see Page 2, lines 3-13 of the instant specification), this it also teaches away from the present invention because one ordinary skill would not utilize the teaching of Murphy to separate sugars. As such, in addition to the '260 reference, the cited references in what is allegedly conceded to be old on Pages 1-3 of the instant specification are also distinguished away for the reason discussed above. Therefore, the present invention is not rendered obvious by the teachings of the '260 reference and the references in the portion of the instant specification identifying those references which are allegedly considered to be old in the art.

With respect to the '874 reference, it is directed to a method of and apparatus for liquid chromatography wherein the flow of fluids through the column are at flow rates of sufficient turbulence to separate the components in the feed solution. However, the '874 reference does not identify the type of solutes that could be separated by the method described therein, other than solute molecules of low molecular weights e.g. 50 or less, or the components in the examples therein, such as a mixture of human transferrin and BSA. (see Column 17, lines 7-9). There is no disclosure therein for the separation of the specific molecules recited in the pending claims. Applicants have already discussed above that the effectiveness of a

chromatographic separation is dependent upon many conditions including the nature and constituents of the feed solution. Since a mixture of human transferrin and BSA and/or small molecular weight solutes are totally different classes of molecules than saccharides as described in the '260 reference, applicants, therefore, submit that one of ordinary skill in the art would not be motivated to combine the primary reference, the '260 reference with the '874 reference in the first instance. Furthermore, since the instant rejection is based upon the combination of three secondary references e.g., (the '874, '104 and '856 references), with the primary references, it follows that when one of the secondary reference, the '874 reference, is distinguished away for the reason discussed above, the prima facie case of obviousness under 35 U.S.C. §103(a) cannot be maintained.

Furthermore, it is to be noted that the eluant used in the '874 reference is either methylene chloride, an organic solvent or a tris (trishydroxymethylaminomthane) buffer containing 2M NaCl (see Examples 1-11 from Column 15, line 18 to Column 20, line 18), rather than water which is recited in Claims 42 et seq of the present invention. Therefore, the '874 reference actually teaches away from the present invention.

Moreover, the '260 reference teaches away from combining it with the '874 reference. As indicated hereinabove, the '260 reference teaches that the particle size of the resin can be no larger than 50 micrometers, while the '874 reference teaches that that the size of the particle of the resin is greater than 50 micrometers. Thus, the '260 reference teaches away from utilizing a larger column filling material, as utilized in the '874 references. Thus, there is no reason to combine the two references in any event.

Even assuming, pro arguendo, that the '874 reference were combined with the '260 reference, and the particle size of the filler disclosed in the '874 reference, which is several

hundred microns, is substituted for the filling material in the '260 reference even though the '260 reference teaches away from such modification, such use is done in the context of only using either methylene chloride or tris buffer containing 2M NaCl as the eluant, not using water as the eluant as expressly required by Claims 42 et seq of the present invention.

As far as the '104 reference is concerned, it teaches a process for recovering xylose from pentosan-containing raw materials by using a strong anion exchange resin in the chromatography. Because it expressly teaches a strong anion exchange resin, it cannot in any way reasonably be considered to suggest a weakly basic anion exchange resin, as recited in Claims 42 et seq of the present invention. Indeed, a person skilled in the art would not find any reason or motive to diminish the anionic character of the secondary reference to the anionic levels of the primary references and/or Claims 42 et seq of the present invention.

Even assuming, pro arguendo, that the '104 reference disclosed water as the eluant to overcome the primary deficiency, it does so in the context of only strong anion exchange resins, not weakly basic anion exchange resins, as expressly required by Claims 42 et seq of the present invention.

With respect to the '856 reference, it relates to the use of cation exchange resins in the separation of convert and non-convert sugar and/or non-sugar components. As such, it teaches away from the primary references and the present invention since they recite a weakly basic anion exchange resin. Therefore, in a similar fashion, even assuming the '856 reference teaches water as eluant and the particle size of the filler is several hundred microns, that teaching is in the context of only cation exchange resins, not with respect to a weakly basic anion exchange resin as expressly required by Claims 42 et seq of the present invention.

Thus, even combining the primary references with the three secondary references (the '874, '104 and '856 references), the combined teaching does not overcome the deficiency of the primary references as discussed above. As such, applicants submit that Claims 42 et seq are not rendered obvious by the combination cited references.

The Office Action has rejected Claims 3, 34 and 35 under 35 U.S.C. §103(a) as defining subject matter which is allegedly rendered obvious by the teachings of the '260 reference or its translation and that which is alleged to be old on Pages 1-3 of the instant specification in view of the teachings of the '874 reference, the '104 reference and the '856 reference and further in view of either U.S. Patent No. 3,982,950 to Schoenrock (" '956 reference") or U.S. Patent No. 6,224,683 (" '683 reference").

Claims 47, 57 and 58 correspond to Claims 3, 34 and 35. Applicants reiterate the comments hereinabove with respect to Claims 42 et seq. Neither the '956 nor the '683 reference overcome the inadequacies of the primary references.

The '956 and the '683 references relate to decolorization and demineralization processes, respectively, which processes are different from a chromatographic separation process claimed in the present invention and described in the '260 reference. Therefore, it is not obvious for one ordinary skill to combine the teachings of the '956 and '683 references with the '260 reference in the first instance. Even when combining all the references, the combination does not overcome the deficiencies described hereinabove. At most, the '956 and '683 references disclose the use of a weakly acid cation exchange resin in the context of decolorization and demineralization processes, respectively. They do not teach the use of weakly basic anion exchange resins, as claimed or that the size of the particles in the weakly anion exchange resin is 100-2000 micrometers, as claimed. Moreover, the '956 and '683 references do not relate to



separation of the components recited in Claim 1 using a weakly basic anion exchange resin. Moreover, they do not address any of the inadequacies described hereinabove. Therefore, the combination cannot teach or suggest the subject matter of Claims 47, 57 and 58. Thus, the rejection thereof under 35 U.S.C. §103(a) is obviated. Withdrawal thereof is respectfully requested.

In the Office Action, Claims 47 (old Claim 3), 48 (old Claim 4), 57 (old Claim 34) and 58 (old Claim 35) stand rejected under 35 U.S.C. §103(a) as describing subject matters which is allegedly obvious over either the '260 reference or what is allegedly conceded to be old on pages 1-3 of the instant specification in view of the '874 reference, the '104 reference and the '856 reference as applied to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of U.S. Patent No. 6,146,856 to Heikkila ('856). Applicants reiterate the comments hereinabove when discussing the first rejection, in which the '856 reference was one of the references cited. Thus, for the reasons provided, the present invention is patentable thereover.

More specifically, the '856 reference relates to the use of cation exchange resins in the separation of convert and non-convert sugar and/or non-sugar components. Even combining the '856 reference with the other references, the combination does not overcome the deficiencies described in the first rejection. At most, the '856 reference discloses the use of a cation exchange resin and does not teach the use of a weakly basic anionic exchange resin or a weakly basic anion exchange resin whereas the size of the filler is 100-2000 micrometers. The teachings in the '856 reference do not relate to a separation of the components recited in Claims 42 et seq using a weakly basic anion exchange resin. Therefore, the combination cannot teach or suggest the use of a weakly basic anion exchange resin in chromatographic separation for

components as defined in Claims 42 et seq wherein the eluant from the weakly basic anion exchange resin is water and the particle size of the filler is 100-2000 micrometers, as claimed. Therefore, the cited secondary reference still fails to overcome the above-described deficiencies. Consequently, this rejection under 35 U.S.C. §103 is overcome. Withdrawal thereof is respectfully requested.

In the Office Action, Claims 5 and 37 stand rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '260 reference or what is allegedly conceded to be old on pages 1-3 of the instant specification in view of the '874 reference, the '104 reference and the '856 reference as applied to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of U.S. Patent No. 4,718,946 to Fries ('946).

Claims 5 and 37 correspond to new Claims 49 and 60, respectively. Applicants reiterate the remarks hereinabove with respect to the first rejection. The teachings of the '946 reference do not overcome the deficiencies described hereinabove.

The '946 reference relates to the use of an acrylic anion exchange resin to remove sulfonic resin extractables from sugar solutions to reduce haze formation in such treatment. The combination of the '946 reference with the other references does not overcome the deficiencies of the primary references. At most, the '946 reference discloses the use of an acrylic anion exchange resin but not for separation of saccherides and/or polyols, as claimed. Moreover, even if combined, the teaching would at most suggest the use of an acrylic anion exchange resin, but not the use of water as the eluant or the particle size being 100-2000 micrometers; it does not address the deficiencies described above with respect to the prior art. Therefore, the combination does not teach or suggest the use of weakly basic anion exchange resin in chromatographic separation for components as defined in Claims 42-46 wherein the eluant from the weakly basic

anion exchange resin is water and the particle size of the filler is 100-2000 micrometers.

Therefore, the cited secondary reference still fails to overcome the above-described deficiencies of the primary references. Thus, the rejection under 35 U.S.C. §103 is overcome; withdrawal thereof is respectfully requested.

In the Office Action, Claims 6-11 stand rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over the teachings of either the '260 reference or what is allegedly conceded to be old on pages 1-3 of the instant specification in view of the '874 reference, the '104 reference and the '856 reference as applied to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of either U.S. Patent No. 4,145,486 to Haag ('486) or U.S. Patent No. 5,863,438 to Katzakian ('438). Claim 11 is further rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly rendered by obvious either the '260 reference or what is conceded to be old on pages 1-3 of the instant specification in view of the '874 reference, the '104 reference and the '856 reference as applied to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of U.S. Patent No. 4,051,221 to Pannekeet ('221). It is to be noted that Claims 6-11 correspond to Claims 50 and 63-67, respectively.

Applicants reiterate the remarks with respect the first rejection. The '486 reference relates to a complex of a weak base exchange resin and a metal in the application of catalyzed reaction. The '438 reference relates to a process for deionization and demineralization of a fluid containing ions. The '221 reference relates to a process of recovering vanadium and molybdenum from an aqueous solution containing a vanadium compound. The processes disclosed in the above-identified three secondary references do not teach, disclose or suggest the use of an anion exchange resin for separating the specific components recited in Claims 42 et seq

and are totally unrelated to the separation of such component. Thus, there would be no reason for one of ordinary skill in the art to combine the teachings of these secondary references with the '260 reference in the first instance.

Moreover, the processes described in the '486, '438 and '221 references do not teach or suggest a chromatographic separation process claimed in the present invention for the specific components recited in Claims 42 et seq. Therefore, it is not obvious for one ordinary skill to combine the teachings of said three secondary references with the '260 reference and to apply the teachings of the references, i.e., a complex of a weak base exchange resin and a metal in the application of catalyzed reaction; a process for deionization and demineralization of a fluid containing ions; and a process of recovering vanadium and molybdenum from an aqueous solution containing a vanadium compound, in the process of chromatographic separation as claimed in the present invention with a reasonable expectation of success of separation. Even combining the three secondary references with the primary references, the combination does not overcome the deficiencies described hereinabove. At most, the three secondary references disclose the use of styrene crosslinked with divinylbenzene and isoprene, but the teachings therein do not relate to separation of the components recited in Claims 42 et seq using a weakly basic anion exchange resin and water and a particle size of the resin being between 100-2000 micrometers.

Thus, these two §103 rejections are obviated. Withdrawal thereof is respectfully requested.

In the Office Action, Claims 15 and 36 stand rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '260 reference or what is allegedly conceded to be old on pages 1-3 of the instant specification in view of the '874

reference, the '104 reference and the '856 reference as applied to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of U.S. Patent No. 3,982,956 to Schoenrock ('956).

Claims 15 and 36 correspond to new Claims 51 and 59, respectively. Applicants reiterate the arguments hereinabove with respect to the first rejection.

The '956 reference relates to a decolorization process, which process is different from a chromatographic separation process claimed in the present invention and described in the '260 reference. Therefore, it is not obvious for one ordinary skill to combine the teachings of the '956 reference with the primary references and to apply the teachings of the '956 reference, i.e., the decolorization process, in the process of chromatographic separation as claimed in the present invention with a reasonable expectation of success of separation.

Even combining all the references, they do not overcome the deficiencies of the primary references. At most, the '956 reference disclose the use of a pH 2-6.5 of the feed solution. However, it does not address any of the inadequacies described hereinabove in the first rejection. Therefore, the combination cannot teach or suggest the use of weakly basic anion exchange resin in chromatographic separation for the components as defined in Claims 42 et seq wherein the eluant from the weakly basic anion exchange resin is water and the particle size of the filler is 100-2000 micrometers. Thus, this rejection is obviated. Withdrawal of this rejection of Claims 51 and 59 under 35 U.S.C. §103 is respectfully requested.

In the Office Action, Claims 20-22, 25 and 37-41 stand rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly rendered obvious by the teachings in either the '260 reference or what is allegedly conceded to be old on pages 1-3 of the instant specification in view of the '874 reference, the '104 reference and the '856 reference as applied

to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of U.S. Patent No. 5,637,225 to Heikkila ('H-225). Claims 26-28 are rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly rendered obvious by the teachings of either the '260 reference or what is conceded to be old on pages 1-3 of the instant specification in view of the '874 reference, the '104 reference and the '856 reference as applied to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of U.S. Patent No. 5,730,877 to Heikkila ('877). Claim 27 is further rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '260 reference or what is allegedly conceded to be old on pages 1-3 of the instant specification in view of the '874 reference, the '104 reference and the '856 reference as applied to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of U.S. Patent No. 5,795,398 to Hyoky ('398).

Applicants have cancelled without prejudice the subject matter in Claims 20-22, 25, 26-28 and 38-41. However, Claims 42-46 and those dependent therein refer to the separation of various components. Applicants will address this rejection to that subject matter. Further, Claim 60 corresponds to Claim 37 and is also included in the arguments hereinbelow.

Applicants reiterate the above arguments with respect to the first rejection. The secondary references do not overcome the inadequacies described hereinabove.

The 'H-225 reference relates to a method for the fractionation of sulphite cooking liquor. The '877 reference relates to a method for fractionating a solution by utilizing a chromatographic simulated moving bed. The '398 reference relates to a method for separating sucrose and a second dissolved component from a sucrose-containing solution, but it does not teach, disclose or suggest the use of a weakly basic anion exchange resin for effecting the separation. Instead, the '398 reference discloses the use of a gel type strong cation exchange

resin for effecting the separation. Applicants respectfully submit that one of ordinary skill in the art would not combine the 'H-225, '877 or '398 references with the primary references in the first instance since none of them teach or disclose the use of a weakly basic anion exchange resin for chromatographic separation. Even when combined, the three secondary references together with the other references do not overcome the deficiencies of the primary references. None of the secondary references teach or disclose or suggest the use of a weakly basic anion exchange resin having the particle size of the filler ranging from 100-2000 micrometers for separating the components recited in Claims 42-46 and 60. Inasmuch as the '260, '874, '104, '856 and what is allegedly conceded to be old do not teach, disclose or suggest this subject matter either, the combination cannot teach, disclose, or suggest this subject matter. Thus, these rejections under 35 U.S.C. §103 are overcome; withdrawal thereof is respectfully requested.

In the Office Action, Claims 30-32 stand rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '260 reference or what is allegedly conceded to be old on pages 1-3 of the instant specification in view of the '874 reference, the '104 reference and the '856 reference as applied to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of U.S. Patent No. 5,730,877 to Heikkila ('877).

Claims 30-32 correspond to new Claims 53-55, respectively. Applicants reiterate the comments hereinabove with respect to the first rejection. The '877 reference does not overcome the deficiencies.

The '877 reference relates to a method for fractionating a solution by using a chromatographic simulated moving bed. The '877 reference does not disclose the use of a weakly basic anion exchange resin having a filler whose particle size ranges from 100-2000 micrometers. Even combining the '877 reference with the primary references, the combination

does not overcome the deficiencies of the primary references. At most, the '877 reference discloses the use of a simulated moving bed and does not relate to separation of the components recited in Claims 42 et seq using a weakly basic anion exchange resin. Therefore, the combination cannot teach or suggest the use of weakly basic anion exchange resin in chromatographic separation for the components as defined in Claims 42-46 wherein the eluant from the weakly basic anion exchange resin is water and the particle size of the filler is 100-2000 micrometers. Thus, this rejection is obviated; withdrawal thereof is obviated.

In the Office Action, Claim 60 (old Claim 37) stands rejected under 35 U.S.C. §103(a) as allegedly defining subject matter which is obvious over either the '260 reference or what is allegedly conceded to be old on pages 1-3 of the instant specification in view of the '874 reference, the '104 reference and the '856 reference as applied to Claims 1, 5-13, 15, 18, 20-22, 24-29, 33 and 36-41 above, and further in view of either U.S. Patent No. 5,068,419 to Kulprathipanja ('419). Applicants reiterate the arguments imposed when discussing the first rejection. The '419 reference does not overcome the deficiencies.

The '419 reference relates to a process wherein an organic acid is separated from a fermentation broth, which process is different from a chromatographic process to separate sugar components as claimed in the present invention and described in the '260 reference. Therefore, there is no motivation for one ordinary skill to combine the teachings of the '419 reference with the '260 reference and to apply the teachings of this reference, i.e., the process of separating an organic acid from a fermentation broth, in the process of chromatographic separation of sugar components as claimed in the present invention with a reasonable expectation of success of separation. Even combining these references, they do not overcome the deficiencies of the primary references. At most, the '419 reference disclose the  $\text{SO}_4^{2-}$  form of the



weakly basic anion exchange resin. However, it does not address any of the inadequacies described hereinabove. Therefore, the combination cannot teach or suggest the use of weakly basic anion exchange resin in chromatographic separation for components as defined in Claims 42 et seq wherein the eluant from the weakly basic anion exchange resin is water and the particle size of the filler is 100-2000 micrometers. Thus, this rejection under 35 U.S.C. §103 is overcome; withdrawal thereof is respectfully requested.

II. In the Office Action, Claims 1, 3-13, 15, 18,20-22, 24-33, and 36-41 are rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly rendered obvious by the teachings in either US Patent No. 5,482,631('631) or WO 00/42225 ('225) in view of the '260 reference, that which allegedly conceded to be old on pages 1-3 of the instant specification, U.S. Patent No. 5,772,874 to Quinn ('874), U.S. Patent No. 5,084,104 to Heikkilä ('104) and U.S. Patent No. 6,146,856 to Heikkilä ('856).

It is to be noted that this is the first rejection under Part II of the response, upon which reference will be made hereinbelow with respect to the subsequent rejections of dependent claims.

With respect to the instant §103 rejection, applicants submit that the claims of the present invention are not rendered obvious by the disclosures of the cited references, since the applied references do not teach, disclose or suggest applicants' claimed method.

Both the '631 and '225 references disclose the use of a strongly basic anion exchange resin for the separation of inositols and sugars.

Specifically, as the Examiner admitted in the Office Action on Page 14, the deficiency of the primary references (US Patent No. 5,482,631('631) or WO 00/42225 ('225)) are: (1) they fail to disclose the use of a weakly basic anion exchange resin; (2) they fail to teach

that the eluant used in the separation being water; and (3) they fail to disclose that the particle size of the filler is at least 100-2000 micrometers.

With respect to the '260 reference, it teaches the use of a weakly basic anion exchange resin, but the column filling material has a particle size of no greater than 50 micrometers. Therefore, the combination of the '631 or '225 references with the '260 reference only suggests, at best, the use of a weakly basic anion exchange resin wherein the particle size of the filler is no greater than 50 micrometers. In fact, this combination teaches away from the filler having particle size greater than 50 micrometers such as 100-2000 micrometers, as claimed. Therefore, the combination of the '631 or '225 references with the '260 reference teaches away from the present invention wherein the particle size of the filler is 100-2000 micrometers. Since the instant rejection is based upon the combination of the secondary references, i.e., the '260 reference, that which is allegedly conceded to be old on pages 1-3 of the instant specification, the '874, '104 '856 and '225 references, with the '631 or '225 references, it follows that when one of the secondary reference, e.g., the '260 reference, teaches away from the claimed invention, a prima facie case of obviousness under 35 U.S.C. §103(a) cannot be maintained.

Furthermore, regarding the cited references in what is allegedly conceded to be old on pages 1-3 of the instant specification, the '631 patent and the publications of Tanaka, Paskach, '225, Bilik, Lindberg, Oshima, Bauer, Brown and Malan do not disclose or suggest the use of weakly basic anion exchange resin. Therefore, the combination of the '631 or '225 references with these references which are allegedly conceded to be old on pages 1-3 of the instant specification, do not teach or suggest the use of a weakly basic anion exchange resin. Regarding the rest of the cited references from what is allegedly conceded to be old on pages 1-3 of the instant specification, i.e., the '791 patent and the publication of Murphy, applicants submit

that although they refer to the use of weakly basic anion exchange resins, they teach away from the invention as defined in Claims 42 et seq. Specifically, the '791 patent discloses a method wherein the components comprised of sugars cannot be separated from each other with this method (see Page 1, lines 29-31 of the instant specification), which is contrary to the methodology of the present invention. Consequently, based therein, one of ordinary skill in the art would not combine the '631 or '225 references with the '791 patent. Moreover, the Murphy reference refers to significant losses of neutral sugars in the separation method described therein (see Page 2, lines 3-13 of the instant specification), thus it also teaches away from the present invention because one ordinary skill would not utilize the teaching of Murphy to separate sugars. Thus, one of ordinary skill in the art would not combine the '631 or '225 references with Murphy. Moreover, the cited references in what is allegedly conceded to be old on pages 1-3 of the instant specification are also distinguished away for the reason discussed above. Therefore, the prima facie case of obviousness under 35 U.S.C. §103(a) cannot be maintained by combining the '631 or '225 references with the '260 reference and the references in the portion of the instant specification identifying those references which are allegedly considered to be old in the art.

With respect to the '874 reference, it is directed to a method of and apparatus for liquid chromatography wherein the flow of fluids through the column is at flow rates sufficient to cause turbulent flow in those fluids and separation of the components therein. However, the '874 reference merely discloses that a mixture of small molecules, e.g. less than 50 molecular weight or human transferrin and BSA can be separated by the claimed method (see Column 17, lines 7-9). There is no disclosure of the method claimed thereof for the separation of saccharides and polyols, which is recited in the Claims 42 et seq. Applicants have already discussed above

that the effectiveness of a chromatographic separation is dependent upon many conditions including the nature and constituents of the feed solution. Since a mixture of human transferrin and BSA or of small molecules are totally different from the components recited in the primary references, applicants, therefore, submit that a person of ordinary skill in the art would not be motivated to combine the primary references with the '874 reference in the first instance. Furthermore, it is to be noted that the eluant used in the '874 reference is either methylene chloride, an organic solvent or a tris (trishydroxymethylaminomthane) buffer containing 2M NaCl (see Examples 1-11 from Column 15, line 18 to Column 20, line 18), rather than water which is recited in Claims 42 et seq of the present invention. Therefore, the '874 reference actually teaches away from the present invention. Therefore, the prima facie case of obviousness under 35 U.S.C. §103(a) cannot be maintained.

Even assuming, pro arguendo, that the '874 reference adequately taught the particle size of the filler being several hundred microns to address a deficiency of the teachings of the '631 or '225 references, it does so in the context of only using either methylene chloride or tris buffer containing 2M NaCl as the eluant, not using water as the eluant as expressly required by Claims 42 et seq of the present invention.

As far as the '104 reference is concerned, it teaches a process for recovering xylose from pentosan-containing raw materials by using a strong anion exchange resin in the chromatography. Because it expressly teaches a strong anion exchange resin, it cannot in any way reasonably be considered to suggest a weakly basic anion exchange resin as recited in Claims 42 et seq of the present invention. Indeed, a person skilled in the art would not find any reason or motive to diminish the anionic character of the secondary reference to the anionic levels necessary for Claims 42 et seq of the present invention.

Even assuming, pro arguendo, that the '104 reference disclosed water as the eluant to overcome the primary deficiency, it does so in the context of only strong anion exchange resin, not weakly basic anion exchange resin as expressly required by Claims 42 et seq of the present invention.

With respect to the '856 reference, it relates to the use of cation exchange resins in the separation of convert and non-convert sugar and/or non-sugar components. As such, there is not motivation to combine it with the primary references, because the '631 and '225 references relate to the use of a strong anion exchange resin. Moreover, it does not teach, disclose or suggest the present invention since Claims 42 et seq of the instant application require a weakly basic anion exchange resin. Therefore, in a similar fashion, even assuming the '856 reference teaches water as eluant and the particle size of the filler is several hundred microns, that teaching is in the context of only cation exchange resins, not weakly basic anion exchange resins, as expressly required by Claims 42 et seq of the present invention.

Regarding the 'H-225 reference, it relates to the use of a strongly acid cation exchange resin for the fractionation of sulphite cooking liquor. As such, there is no motivation to combine it with the '631 and '225 references since the 'H-225 reference does not relate to chromatographic separation and it does not use strong anion exchange resins, as required in the '631 and '225 references. Further, it does not overcome the inadequacies described hereinabove as it does not utilize a weakly basic anion resin and it also teaches away from the present invention since Claim 42 of the instant application recites a weakly basic anion exchange resin. Therefore, in a similar fashion, even assuming the '225 reference teaches the separation of arabinose, pentose, hexose, xylitol and rhamnose, that teaching is in the context of only strongly

acid cation exchange resin, not a weakly basic anion exchange resin, as expressly required by Claims 42 et seq of the present invention.

Thus, even combining the '631 and '225 references with all of the secondary references, the combined teaching does not overcome the deficiency discussed in the above. As such, applicants submit that Claims 42 et seq are not rendered obvious by the teachings of the cited references. Accordingly, this rejection of these claims under 35 U.S.C. §103 is obviated; withdrawal thereof is respectfully requested.

In the Office Action, Claims 47 (old Claim 3), 57 (old Claim 34) and 58 (old Claim 35) are rejected under 35 U.S.C. §103(a) as defining subject matter allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18,20-22, 24-33, and 36-41 above, and further in view of either U.S. Patent No. 3,982,956 to Schoenrock ('956) or U.S. Patent No. 6,224,683 to Tanikawa ('683). Applicants reiterate the arguments hereinabove with respect to the first rejections in Part II.

The '956 and the '683 references relate to decolorization and demineralization processes respectively, which processes are different from a chromatographic separation process claimed in the present invention and described in the '631 and '225 references. Therefore, since the processes of the secondary reference do not relate to the separation of saccharides and/or polyois, there is no motivation for one ordinary skill to combine the teachings of the '956 and '683 references with the '225 or '631 references in the first instance. Even combining all the references, they do not overcome the deficiencies described hereinabove with respect to the first rejection in Part II. At most, the '956 and '683 references disclose the use of a weakly acid

cation exchange resin in the context of decolorization and demineralization processes respectively. However, the '956 and '683 references do not relate to separation of the components recited in Claims 42 et seq using a weakly basic anion exchange resin. They do not address any of the inadequacies of the first rejection under Part II. Therefore, the combination does not teach or suggest the use of weakly basic anion exchange resin in chromatographic separation for components as defined in Claims 42 et seq wherein the eluant from the weakly basic anion exchange resin is water and the particle size of the filler is 100-2000 micrometers.

In the Office Action, Claims 47 (old Claim 3), 48 (old Claim 4), 57 (old Claim 34) and 58 (old Claim 35) are rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18,20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 6,146,856 to Heikkila ('856).

Applicants reiterate the arguments of the first rejection under Part II, which also include the '856 reference.

The '856 reference relates to the use of cation exchange resins in the separation of convert and non-convert sugar and/or non-sugar components. Even combining the '856 reference with the references cited in the first rejection under Part II, the combination does not overcome the deficiencies described in the discussion of the first rejection under Part II. At most, the '856 reference disclose the use of a cation exchange resin and does not relate to a separation of the components recited in Claims 42 et seq using a weakly basic anion exchange resin. Therefore, the combination cannot teach or suggest the use of a weakly basic anion exchange resin in chromatographic separation for components as defined in Claims 42 et seq

wherein the eluant from the weakly basic anion exchange resin is water and the particle size of the filler is 100-2000 micrometers. Therefore, the cited secondary reference still fails to overcome the above-described deficiencies of the primary references. Thus, this rejection under 35 U.S.C. §103 is overcome; withdrawal thereof is respectfully requested.

In the Office Action, Claims 49 (old Claim 5) and 60 (old Claim 37) are rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18,20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 4,718,946 to Fries ('946 reference).

The '946 reference relates to the use of an acrylic anion exchange resin to remove sulfonic resin extractables from sugar solutions to reduce haze formation in such treatment. The combination of the '946 reference with the references cited in the first rejection under Part II does not overcome the deficiencies described above. At most, the '946 reference discloses the use of an acrylic anion exchange resin and does not relate to separation of the components recited in Claims 42 et seq using a weakly basic anion exchange resin. Therefore, the combination cannot teach or suggest the use of weakly basic anion exchange resin in chromatographic separation for components as defined in Claims 42 et seq wherein the eluant from the weakly basic anion exchange resin is water and the particle size of the filler is 100-2000 micrometers. Therefore, the cited secondary reference still fails to overcome the above-described deficiencies of the references cited in the first rejection under Part II. Thus, the rejection under 35 U.S.C. §103(a) is obviated; withdrawal thereof is respectfully requested.



In the Office Action, Claims 50 and 63-66 (old Claims 6-11) are rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18,20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 4,145,486 to Haag ('486) or U.S. Patent No. 5,863,438 to Katzakian ('438). Claim 69 (old Claim 61) is further rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18,20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 4,051,221 to Pannekeet ('221).

Applicants reiterate the arguments set forth in the first rejection under Part II, these additional references cited do address the deficiencies described hereinabove with respect to this first rejection. The '486 reference relates to a complex of a weak base exchange resin and a metal in the application of catalyzed reaction. The '438 reference relates to a process for deionization and demineralization of a fluid containing ions. The '221 reference relates to a process of recovering vanadium and molybdenum from an aqueous solution containing a vanadium compound. The processes disclosed in the above-identified three secondary references do not teach, disclose or suggest the use of an anion exchange resin for separating the specific components recited in Claims 42 et seq. Thus, there would be no reason for one of ordinary skill in the art to combine the teachings of the secondary references with the '631 or '225 references in the first instance for they do not relate to the separation of sugar or polyols.

Moreover, the processes described in the '486, '438 and '221 references are different from a chromatographic separation process claimed in the present invention for the specific components recited in Claims 42 et seq. Therefore, it is not obvious for one ordinary skill to combine the teachings of the three secondary references with the primary references and to apply the teachings of the references, (i.e., a complex of a weak base exchange resin and a metal in the application of catalyzed reaction; a process for deionization and demineralization of a fluid containing ions; and a process of recovering vanadium and molybdenum from an aqueous solution containing a vanadium compound), in the process of chromatographic separation as claimed in the present invention with a reasonable expectation of success of separation. Even combining the three secondary references with the references cited in the first rejection under Part II, the combination does not overcome the deficiencies of '631 or '225 references. At most, the three secondary references disclose the use of styrene crosslinked with divinylbenzene and isoprene, but the teachings therein do not relate to separation of the components recited in Claims 42 et seq. using a weakly basic anion exchange resin using water as the eluant and particle size of the filler being 100-2000 micrometers, as claimed. Therefore, this rejection under 35 U.S.C. §103(c) is obviated; withdrawal thereof is respectfully requested.

In the Office Action, Claims 51 and 59 (old Claims 15 and 36, respectively) are rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18,20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 3,982,956 to Schoenrock ('956).

This secondary reference does not overcome the deficiencies of the first rejection in Part II. The '956 reference relates to a decolorization process, which process is different from a chromatographic separation process claimed in the present invention and described in the '631 and '225 references. Therefore, it is not obvious for one ordinary skill to combine the teachings of the '956 reference with these latter references and to apply the teachings of the reference, i.e., the decolorization process, in the process of chromatographic separation as claimed in the present invention with a reasonable expectation of success of separation. Even combining all the references, they do not overcome the deficiencies described hereinabove with respect to the first rejection in Part II. At most, the '956 reference disclose the use of a feed solution having a pH of 2-6.5. However, it does not address any of the inadequacies described above with respect to the first rejection under Part II. Therefore, the combination cannot teach or suggest the use of weakly basic anion exchange resin in chromatographic separation for components as defined in Claims 42 et seq wherein the eluant from the weakly basic anion exchange resin is water and the particle size of the filler is 100-2000 micrometers. Thus, this rejection is overcome; withdrawal thereof is respectfully requested.

In the Office Action, Claims 20-22, 25, and 37-41 are rejected under 35 U.S.C. §103(a) as defining subject matter allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18, 20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 5,637,225 to Heikkila ('H-225 reference). Claims 26-28 are rejected under §103(a) as defining subject matter which is allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant

specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18,20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 5,730,877 to Heikkila ('877 reference). Claim 27 is further rejected under §103(a) as defining subject matter which allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18,20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 5,795,398 to Hyoky ('398 reference).

As indicated hereinabove, applicants have cancelled Claims 20-22, 25, 26-28 and 38-41. However, Claims 42-46 and those dependent thereon refer to separation of various components recited in these claims. Applicants are addressing this rejection to that subject matter in Claims 42-46. Further, Claim 60 corresponds to old Claim 37 and this rejection is also incorporated here.

Applicants reiterate the arguments hereinabove with respect to the first rejection of Part II. The secondary references do not overcome the deficiencies.

The 'H-225 reference relates to a method for the fractionation of sulphite cooking liquor. The '877 reference relates to a method for fractionating a solution by utilizing a chromatographic simulated moving bed. The '398 reference relates to a method for separating sucrose and a second dissolved component from a sucrose-containing solution, but it does not teach, disclose or suggest the use of a weakly basic anion exchange resin for effecting the separation. Instead, the '398 reference discloses the use of a gel type strong cation exchange resin for effecting the separation. Applicants respectfully submit that the combination of the '225, '877 or '398 references do not teach or disclose the use of a weakly basic anion exchange

resin for chromatographic separation of the components in Claims 42 et seq. Even when combined, the three secondary references together with the references cited in the first rejection do not overcome the deficiencies. None of the secondary references teach or disclose or suggest the use of a weakly basic anion exchange resin having the particle size of the filler ranging from 100-2000 micrometers for separating the components recited in Claims 42 et seq. Thus, these three rejections are overcome; withdrawal thereof is respectfully requested.

In the Office Action, Claims 53-55 (old Claims 30-32) are rejected under 35 U.S.C. §103(a) as defining subject matter which is allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18, 20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 5,730,877 to Heikkila ('877).

Applicants reiterate the comments hereinabove with respect to the first rejection in the Part II. The secondary references do not overcome the deficiencies. The '877 reference relates to a method for fractionating a solution by a chromatographic simulated moving bed. The '877 reference does not disclose the use of a weakly basic anion exchange resin having a filler whose particle size ranges from 100-2000 micrometers. Even combining the '877 reference with the primary references, the combination does not overcome the deficiencies described in the discussion of the first rejection under Part II. At most, the '877 reference discloses the use of a simulated moving bed and does not relate to separation of the components recited in Claims 42 et seq. using a weakly basic anion exchange resin. Therefore, the combination cannot teach or suggest the use of weakly basic anion exchange resin in chromatographic separation for the components as defined in Claims 42 et seq. wherein the eluant from the weakly basic anion

exchange resin is water and the particle size of the filler is 100-2000 micrometers. Thus, this rejection is overcome; withdrawal thereof is respectfully requested.

In the Office Action, Claim 60 (old Claim 37) is rejected under 35 U.S.C. §103(a) as allegedly obvious over either the '631 reference or '225 reference in view of the '260 reference, what is allegedly conceded to be old on pages 1-3 of the instant specification, the '874 reference, the '104 reference and the '856 reference as applied to claims 1, 3-13, 15, 18, 20-22, 24-33, and 36-41 above, and further in view of U.S. Patent No. 5,068,419 to Kulprathipanja ('419).

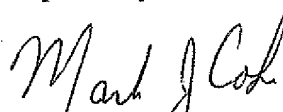
Applicants reiterate the comments to the first rejection in Part II. The secondary reference does not overcome the inadequacies of the references.

The '419 reference relates to a process wherein an organic acid is separated from a fermentation broth, which process is different from a chromatographic process to separate sugar components as claimed in the present invention and described in the '631 and '225 references. Therefore, there is no motivation for one ordinary skill to combine the teachings of the '419 reference with the '225 or '631 references and to apply the teachings of this reference, i.e., the process of separating of sugar components as claimed in the present invention with a reasonable expectation of success of separation. Even combining these references, they do not overcome the deficiencies of the first rejection in Part II. At most, the '419 reference discloses the  $\text{SO}_4^{2-}$  form of the weakly basic anion exchange resin. However, it does not address any of the inadequacies described hereinabove. Therefore, the combination cannot teach or suggest the use of weakly basic anion exchange resin in chromatographic separation for components as defined in Claims 42 et seq wherein the eluant from the weakly basic anion exchange resin is

water and the particle size of the filler is 100-2000 micrometers. Thus, this rejection under 35 U.S.C. §103; withdrawal thereof is respectfully requested.

Thus, in view of the foregoing amendments and remarks, it is firmly believed that the present application is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Mark J. Cohen". The signature is fluid and cursive, with the first name "Mark" and last name "Cohen" clearly distinguishable.

Mark J. Cohen  
Registration No. 32,211

Scully, Scott, Murphy & Presser, P.C.  
400 Garden City Plaza-Suite 300  
Garden City, New York 11530  
(516) 742-4343  
MJC/AZ:dg